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The need to integrate speech acoustics course work across the speech-language pathology curriculum

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The profession of speech-language pathology faces two critical challenges: (1) the lack of sufficient evidence-based practice due to limited clinical research in the field and (2) the dramatic decline in recent years in the number of students pursuing PhDs. Although speech acoustics courses are a part of most undergraduate programs in speech-language pathology, these courses are often disassociated from students' additional undergraduate and graduate course work and clinical training. These isolated speech science courses may inadequately prepare speech-language pathology students for future research-based course work and clinical practice. This paper reports results of a survey of 140 former undergraduate students who took a speech acoustics course between 1994 and 2003. The survey asks students about additional speech acoustics course work, related research experience, and use of speech science information in clinical practice. The majority of students surveyed report that speech acoustics information is largely isolated in one undergraduate course. This paper concludes that programs must consider better harmonizing speech science course work with other undergraduate and graduate course work and clinical training to meet the current research related challenges to the profession.

Introduction

The profession of speech-language pathology currently faces two challenges: (1) a lack of sufficient evidence-based practice (EBP) due to limited clinical research in the field and (2) a decline in recent years in the number of students pursuing PhDs. This paper proposes that a more complete integration of speech science course work into speech-language pathology curriculum would strengthen student training and aid in meeting the EBP and PhD challenges to the profession.

The first challenge, an inadequate base of research and therefore limited EBP, threatens the strength of the speech-language pathology profession. In 2004 ASHA's Research and Scientific Affairs Committee issued a technical report that set forth, among other things, to highlight the importance of EBP and to propose measures to increase the amount of sound, scientific evidence to support clinical procedures. The report [1] noted that strong EBP research requires "scientific acumen" as well as research expertise. The knowledge and skills required to conduct quality research cannot be obtained in one class, but rather must be developed in students over time and with hands on experience. An undergraduate course in speech science is an excellent beginning, particularly if that course informs the student of both experimental practice and current instrumentation and procedures available for the objective measurement of speech and voice production. However, an undergraduate course in speech science does not serve students well unless the information is linked to future course work and clinical procedures.

The second challenge, a significant decrease in the number of students pursuing PhDs, threatens the sustainability of speech-language pathology as a profession. In December 2002 the Joint Ad Hoc Committee on the Shortage of PhD Students and Faculty in Communication Sciences and Disorders issued a report titled "Crisis in the Discipline: A Plan for Reshaping our Future." This report sent out a call to action to "re-engineer the academic culture in the field, at all levels from undergraduate, to graduate, to post graduate." This call for curricular revision aimed to "enhance the scientific preparation" of students in the field [2]. Although a rigorous undergraduate course in speech science provides an important base for the scientific preparation of students in the field of speech-language pathology, it is not enough unless it both provides a clear scientific foundation for the study of speech and voice production and serves as the catalyst for future scientific examination of speech and voice production and disorders.

The shortage of PhD. students and the need for EBP are related issues. As the 2002 Report notes, "Fewer PhD faculty means less research in communication sciences and disorders, which in turn means a slowed growth in our understanding of human communication and a longer time to develop and test improvements to our treatment options." Thus, what is needed is science-based learning infused throughout the undergraduate and graduate curriculum with clear application to clinical practice and research. However, as this survey study demonstrates, many programs are not doing enough to provide science-based instruction related to speech-language pathology or are not making students aware of the importance of such instruction to research and practice in the field.

Method

Surveys were sent to 350 former students from 18 undergraduate speech and voice science courses at between fall 1994 and spring 2003. Of the 350 surveys sent out, 140 were returned and filled out correctly. The surveys asked the students three questions: (1) Have you had any additional course work in speech and voice science or speech acoustics?; (2) Have you participated in any research or other experiences related to speech and voice science and/or speech acoustics?; and (3) In your current position do you use information learned in your undergraduate speech and voice science course? For each question, students answered "yes" or "no". If students answered "yes," the survey asked the students to list and describe or explain.

Although this study surveyed students who were undergraduates at Loyola College in Maryland, the majority of these students continued their graduate course work at institutions across the nation. Thus although results are based on this limited sample, conclusions drawn are likely applicable to many programs.

Results and Discussion

Additional speech science course work

When asked, "Have you had any additional course work in speech and voice science or speech acoustics?" the majority of students (80/140 or 57%) answered "no". Students who responded "yes" listed additional courses taken related to speech science (Table 1). The numbers in the table add up to 67 because 53 students reported taking one additional course related to speech and voice science and seven students reported taking two additional courses. Thirty students listed a voice disorders course. For these students, the connection of the voice course to speech science was clear. However, of the total 140 student respondents, it is unlikely only 30 of them took a voice disorders course at the graduate level. Thus, for a clear majority of respondents the relationship between a voice disorders course and speech science was not clear. Twenty-four students listed advanced speech acoustics courses (acoustic phonetics, speech science, or experimental phonetics) or a clinical instrumentation course. These courses have a clear connection to speech science. However, one third of the students who reported taking an advanced speech science course stated that the course was largely a repetition of the undergraduate course material. Six students saw a connection to speech science in aural habilitation and clinical audiology courses, both courses most students take at some point in their studies. Two students saw a connection in a psychoacoustics course and one student saw a connection in a cleft palate course, both courses possibly not required in all programs. Although most students take an articulation or phonology course and/or a research course, no students reported such courses on the survey. Thus students are missing what should be a clear connection to speech science information in these courses.

One reaction to these student responses would be for programs to add a graduate level course with speech science related information if they do not already have one. This is a good idea, particularly if the course goes beyond what was learned at the undergraduate level. However, this is not the best solution. A better solution calls for a two-point plan. First, the undergraduate speech science course must be designed to make the connection to future course and clinical work clear. Second, other course work in a program must refer to and incorporate speech science based learning and information into the curriculum. Both plans will likely meet resistance. Those who teach speech science courses often fight to keep the course "scientific," and not clinically based. For these professors, making the course applicable to future clinical course work seems at cross-purposes with preparing future scientists. However, unless the initial undergraduate speech science course prepares the students for application of the information in clinically oriented master's degree course work, the importance of the material may be lost. Additionally, other professors must be willing and able to infuse speech science-based information into courses in a meaningful way for students. Otherwise, speech science information will remain largely isolated in one undergraduate course for the majority of students.

Additional coursework in speech and voice science reported by students	**Number of students reporting this course work**
Voice disorders course	30
Speech science course	24
Clinical instrumentation course	4
Aural habilitation course	3
Clinical audiology course	3
Psychoacoustics course	2
Cleft palate disorders course	1

Table 1. Additional course work in speech science as reported by students

Participation in speech science research

When asked, "Have you participated in any research or other experiences related to speech and voice science and/or speech acoustics?" the vast majority of students (113/140 or 81%) answered "no". Students who responded "yes" listed related experiences (Table 2). Only 10 students reported clinical work as a related experience. However, all graduate students participate in clinical work related to speech and voice production. Unfortunately, for most of them (130/140 or 93%) any relation back to basic speech acoustic information has been forgotten. For students, this lack of connection is likely to make clinical work less scientifically grounded. For the profession, this lack of connection is likely to make the collection of evidence-based information to justify practice less likely to occur. Given the clear clinical orientation of the profession, the only way to make headway is to clarify the science-practice connection. In fact, in theory, and hopefully in all practice in the near future, the only way to be a good clinician is to be a good scientist.

Nine students reported completing a project or class assignment related to speech science, with five of these in a voice class. However, it is likely that most students complete projects and assignments for several classes. The responses therefore indicate that students either do not choose topics related to speech science and/or do not see the connection between their topic and speech science. Once again, programs need to make the connection back to science-based information more clearly for these students. It is likely that most respondents completed a project related in some way to speech or voice production or measurement. If they didn't this is probably cause for concern. If they did, and did not make the connection or apply information learned, this is certainly cause for concern. Either way, an infusion of speech science information across curricula would increase the likelihood of speech science based choices for students and would

make the speech science connection more clear for students already choosing related topics.

Additional research or other experiences reported by students	Number of students reporting this experience
Clinical work	10
Project or assignment for voice course	5
Project or assignment for other graduate course	4
Work in a research lab	4
Independent study or master's thesis	2
Teaching assistant	2

Table 2. Research or other experiences related to speech science reported by students

Only four students had the opportunity to work in a research lab, only two students chose to do an independent study or thesis they related to speech science, and only two students worked as a teaching assistant in a course related to speech science. These low numbers confirm either that students have limited opportunities for speech research endeavors or that students do not choose to pursue such endeavors. Either way, programs must do something to increase the number of students participating in research. Without this experience, students are not likely to consider a PhD as a possible option and are not as likely to be strong candidates for a PhD program.

Use of speech science in current practice

When asked, "In your current position do you use information learned in your undergraduate speech and voice science course?" the majority of students (78/140 or 56%) answered "no". Once again, for these former students who are now practitioners in the field, the connection from clinical practice and theory back to basic speech science information and methodology has been lost. Student responses to this question closely mirror responses to the first question. So, it seems that beyond the initial undergraduate speech science course, most students see no future connection to other courses, future clinical work, or their career path.

Conclusion

The strength and sustainability of the speech-language pathology profession is threatened by limited EBP and a shortage of PhD students. One way to address both threats is to increase science-based learning clearly related to speech-language pathology. Speech science information must be infused more meaningfully for students across both undergraduate and graduate curricula. Speech science courses should serve not only as a strong basis for scientific preparation of students, but also as a launch pad for future clinical practice and research in speech-language pathology. This will involve a cultural shift at both the program level and the profession level. For programs, this shift must begin during the undergraduate speech science course with more clearly drawn application to future course work, clinical practice, and research. It must continue throughout many courses and through the clinical experience with the infusion of speech science-based information. For many programs this will involve increased dialogue between the speech science professor and others and may involve a shift from viewing the speech science professor as "isolated" or "unique". Additionally, programs must offer more speech science based research opportunities to students in several classes. If professors are not comfortable guiding a student through such a project, they must be comfortable seeking the assistance of a professor with a speech science background. Likewise, the speech science professor must be willing to participate, and in time educate, other colleagues.

At the profession level, this will mean a shift in practical application of ASHA standard guidelines. ASHA has already taken a step by requiring a second general science course at the undergraduate level. More importantly, ASHA must require that science based course work more clearly related to the field, such as courses in speech science, be infused across graduate curriculum in a clear, meaningful, and opportunistic way for students. An undergraduate speech science course should not stand alone as the prime course for the scientific basis of the discipline. This is too great a burden to place on the instructor, the course, the students, and the profession. A commitment to speech science across the curriculum will increase the likelihood of strong research to support EBP by students more likely to pursue a PhD, and will insure the continuation of speech-language pathology as a strong and sustainable profession.

References

[1] American Speech-Language-Hearing Association (2004). Evidence-Based Practice in Communication Disorders: An Introduction [Technical Report]. Available at: http://www.asha.org/members/deskref-journals/deskref/default

[2] American Speech-Language-Hearing Association and the Council of Academic Programs in Communication Sciences and Disorders (2002). Crisis in the discipline: A plan for reshaping our future. Available at: http://www.capscd.org/reports/JointAdHocCmteFinalReport.pdf